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| 09/468,489 | 12/20/1999 | HONGYONG ZHANG | 1612.63479 | 3703 |

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EXAMINER

QUACH, TUAN N

ART UNIT PAPER NUMBER

2814

DATE MAILED: 11/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/468,489

Applicant(s)

ZHANG, HONGYONG

Examiner

Tuan Quach

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 7-21 and 23-29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 and 22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 December 1999 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s): _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Applicant's election with traverse of claims 1-6 and 22 in Paper No. 0903 (filed September 29, 2003) is acknowledged. The traversal is on the ground(s) that there is no serious burden and the field of search would be the same or overlapping. This is not found persuasive because applicant has not submitted any evidence that the species are not patentably distinct. Furthermore, it remains that there would be serious burden given that the search and examination of the various species would correspond to the numerous embodiments in the specification and numerous drawings.

The requirement is still deemed proper and is therefore made FINAL.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

For convenience, in referencing the applied prior art, "et al." are omitted.

Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Konuma taken with Ohtani and Yudasaka.

Konuma (U.S. Pat. 5,620,905) shows the gate pattern offset (or "retarded") from the edges of the gate insulating patterns 310/311/312/313, thereby creating offset regions thereunder, forming lightly doped regions and heavily doped regions therein, e.g., regions 317-319, and regions 314-316, respectively, the use of laser beam annealing is also shown. Note particularly the offset region 318 which correspond to the lightly doped region and region 315 which corresponds to the heavily doped region.

See column 9 line 51 to column 11 line 47, Figs. 5A-5E. Konuma lacks primarily the explicit recitation that gate insulating layer is not larger than 50 nm as recited in claim 1 lines 6-7 and that hydrogen also implanted into the doped regions during the implantation as in claim 1 lines 1-3.

Ohtani (U.S. Pat. 6,307,214) also shows the formation of offset gate e.g., as shown in Fig. 13C with respect to gate oxide 65-77 on semiconductor regions, implant for forming LDD region 80, 84 and source drain 78/79, 82, 83. See Figs. 13A-1D, column 18 line 10-50.

It would have been obvious to one skilled in the art in practicing the Konuma process to have included the hydrogen in the implant wherein the implanted ions would permit the formation of low concentration which can be activated at a low temperature thereby permitting such LDD TFT structures on glass substrate and permitting the use of low electrical resistance as delineated in Yudasaka, column 3 lines 1-16, column 5 lines 9-25 wherein such inclusion of hydrogen is taught for the lightly doped regions and for the source drain regions, column 18 line 50 to column 19 line 18, column 24 line 29 to column 25 line 12, column 27 line 50 to column 28 line 7 column 20 lines 7-39. Note that the hydrogen is not required to be implanted to the channel region which is masked by the gate thereon and into the implanted regions which correspond to the source/drain and low concentration regions. It would have been within the purview of one skilled in the art to have selected the conventional implant apparatus as in claim 2, the desired energy as in claim 3 depending on the projected range desired. The use of hydride as ion source is well known in the art, e.g., Yudasaka, column 29 line 18 et seq., and as

such would have been obvious. Regarding the gate insulating layer being less than 50 nm, such selection would have been conventional and obvious and would have been within the purview of one skilled in the art to have employed such gate oxide layer of 50 nm or less given the teachings of Ohtani, column 5 lines 35-37, column 14 lines 54-55. Regarding applicant's argument that Yadasaka does not teach prevent hydrogen implantation in the channel region, this has been considered but is not deemed to be persuasive. Applicant has failed to show that Yadasaka teaches such hydrogen implantation into the channel region and further overlooks the implants in Yadasaka with the gate as a mask over the channel which would block such hydrogen in the channel. Applicant further failed to show that the implant with the channel being blocked by the gate in place as in Yadasaka would result in the channel being implanted with hydrogen. The positioning of the gate before the implant is important since it serves to delineated the regions being implanted. For instance, the implant of the source/drain and lightlyly doped source drain with the gate in place or "self-aligned" would result in dopants being implanted in lightly doped regions and/or source drain regions not covered by the gate but would not result in the dopants being implanted into the channel region under the gate. See for instance, Figs. 22A-22C, Figs. 25A-25C, 27A-27C, etc., wherein all the implant are effected with the gate in place blocking and defining the channel region 607.

Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Konuma taken with Ohtani and Yudasaka as applied to claims 1-4 above, and further in view of Yamazaki.

Regarding the use of laser annealing, Konuma further teaches the use of laser annealing, e.g., column 5 lines 18-22, column 6 lines 5-12. Yamazaki also teaches the use of laser annealing for recrystallization, see, e.g., column 5 lines 60-64 and for activation, column 6 lines 24-36.

It would have been obvious to one skilled in the art in practicing the above process to have employed laser annealing to recrystallize and to activate dopants since such corresponds to conventional techniques for such purposes as shown in Konuma and Yamazaki. The damage would be recovered during such activation, or alternatively, it would have been obvious to one skilled in the art to have obtained recovery of the damage during such annealing.

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Konuma taken with Ohtani and Yamazaki.

Konuma (U.S. Pat. 5,620,905) shows the gate pattern offset (or "retarded") from the edges of the gate insulating patterns 310/311/312/313, thereby creating offset regions thereunder, forming lightly doped regions and heavily doped regions therein, e.g., regions 317-319, and regions 314-316, respectively, the use of laser beam annealing is also shown. Note particularly the offset region 318 which correspond to the lightly doped region and region 315 which corresponds to the heavily doped region. See column 9 line 51 to column 11 line 47, Figs. 5A-5E. Konuma lacks primarily the explicit recitation that gate insulating layer is not larger than 50 nm as recited in claim 22 line 6-7 and the laser annealing. Regarding the use of laser annealing, Konuma further teaches the use of laser annealing, e.g., column 5 lines 18-22, column 6 lines 5-12.

Yamazaki also teaches the use of laser annealing for recrystallization, see, e.g., column 5 lines 60-64 and for activation, column 6 lines 24-36.

Ohtani (U.S. Pat. 6,307,214) also shows the formation of offset gate e.g., as shown in Fig. 13C with respect to gate oxide 65-77 on semiconductor regions, implant for forming LDD region 80, 84 and source drain 78/79, 82, 83. See Figs. 13A-1D, column 18 line 10-50.

It would have been obvious to one skilled in the art in practicing the Konuma process to have selected the gate insulating layer being less than 50 nm wherein such selection would have been conventional and obvious and would have been within the purview of one skilled in the art to have employed such gate oxide layer of 50 nm or less given the teachings of Ohtani, column 5 lines 35-37, column 14 lines 54-55. It would have been obvious to one skilled in the art to have employed the laser annealing for the reasons delineated above with regard in claims 5-6. It would have been obvious to one skilled in the art in practicing the above process to have employed laser annealing to recrystallize and to activate dopants since such corresponds to conventional techniques for such purposes as shown in Konuma and Yamazaki. The damage would be recovered during such activation, or alternatively, it would have been obvious to one skilled in the art to have obtained recovery of the damage during such annealing.

Applicant's arguments filed April 4, 2003 have been fully considered but they are not persuasive.

Applicant argues that Yadasaka does not teach prevent hydrogen implantation in the channel region. Applicant however has failed to show that Yadasaka teaches such hydrogen implantation into the channel region and further overlooks the implants in Yadasaka with the gate as a mask over the channel which would block such hydrogen in the channel. Applicant further failed to show that the implant with the channel being blocked by the gate in place as in Yadasaka would result in the channel being implanted with hydrogen. The positioning of the gate before the implant is important since it serves to delineated the regions being implanted. For instance, the implant of the source/drain and lightlyly doped source drain with the gate in place or "self-aligned" would result in dopants being implanted in lightly doped regions and/or source drain regions not covered by the gate but would not result in the dopants being implanted into the channel region under the gate. See for instance, Figs. 22A-22C, Figs. 25A-25C, 27A-27C, etc., wherein all the implant are effected with the gate in place blocking and defining the channel region 607.

Applicant's argument further appears to be inapplicable to claim 22 as this claim does not recite any limitation regarding the hydrogen.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Quach whose telephone number is 703-308-1096. The examiner can normally be reached on M - F from 9 to 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor Wael Fahmy can be reached on (703) 308-4918. The fax phone number for

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.


Walter G. Smith
Receptionist